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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the washing station used in case a contaminant, dirt, etc. on plates, such as a glass substrate, a silicon wafer, or a printed wiring substrate, are washed and removed in a semi-conductor production process, a liquid crystal display production process, or production processes, such as various electronic parts.

[0002]

[Description of the Prior Art] In the production process of a liquid crystal display, the production process of a printed wiring substrate, etc., in case pattern formation of the circuit wiring is carried out in a well-known phot process on a substrate as an example, a washing process is indispensable. Drawing 10 is the sectional view of the washing station 1 of the typical conventional example. It is fixed to the rotation attachment component 3 by vacuum adsorption etc., and the rotation drive of the work piece 2 set as the object of washing which is the glass substrate of the phase where the thin film of ITO (indium stannic-acid ghost) was formed in the front face as an example, and this was etched into the desired circuit wiring configuration etc. is carried out in the arrow mark A1 direction with high precision. The nozzles 7 and 8 of the pair which such a work piece 2 and the rotation attachment component 3 are contained in the scattering prevention frame 4, and the rotation member 5 by which a rotation drive is carried out is inserted in an arrow mark A 2-way from the upper part, and injects a penetrant remover near [ brush 6 ] the rotation member 5 are formed.

[0003] A penetrant remover is blown off from nozzles 7 and 8 on a work piece 2, and he is trying for the rotation member 5 it runs in the direction of arrow mark A3 to attain detergency in this conventional example, carrying out a rotation drive at this penetrant remover and an arrow mark A 2-way.

[0004]

[Problem(s) to be Solved by the Invention] In the conventional washing station 1, in case dirt, a contaminant, etc. of a work piece 2 are removed, a contaminant, dirt, etc. which the brush 6 of the rotation member 5 is soiled with that dirt, contaminant, etc., and such dirt, a contaminant, etc. are generally difficult to remove, and remain to the brush 6 for this reason will carry out the reattachment to the glass substrate washed next. Consequently, removal capacity, such as a contaminant with a brush 6, will decline. Moreover, nozzles 7 and 8 have the technical problem that it is difficult for a brush 6 to cover the whole range in contact with a work piece 2, and to spread a penetrant remover, and removal effectiveness, such as a contaminant, falls in order to carry out the regurgitation of the penetrant remover from the exterior to a brush 6.

[0005] The purpose of this invention is offering the washing station which prevents the situation the washing member washed to an object being soiled while it cancels an above-mentioned technical technical problem and can improve the washing capacity over an object.

[0006]

[Means for Solving the Problem] The rotation drive of this invention is carried out at the circumference of axis of rotation, and range other than near [ in the direction one side edge of an axis ] a center-of-rotation location is equipped with a washing member. The rotation member which covers said one side edge from an other side edge and by which the bore which carries out opening is formed in the interior of the range near [ said ] a center-of-rotation location, It is the washing station characterized by including the covering member in which the penetrant remover feed zone material which the enclosure of the rotation member is carried out, it holds free [ rotation ], and said washing member side carries out

opening, and supplies a penetrant remover towards said another side edge of a rotation member is prepared.

[0007]

[Function] With the washing station of this invention, when it is going to wash an object, the washing member of a rotation member with which the side edge section was equipped on the other hand slides on an object, and detergency is performed. At this time, the penetrant remover for washing is supplied to the other side edge of a rotation member through a covering member, passes along the bore currently continued and formed in the side edge section on the other hand from the other side edge concerned, and flows out near [ in / on the other hand / the side edge section ] the center-of-rotation location of a rotation member. Therefore, the penetrant remover on an object is diffused in the method of outside through a washing member. Thereby, detergency is performed to a washing member using a penetrant remover.

[0008] moreover, since it spreads in the method of outside from near the center-of-rotation location of said rotation member, a penetrant remover can do \*\* over which said washing member covers the front face in contact with an object, and spreads a penetrant remover, can boil washing capacity markedly and can improve. Moreover, a washing member can prevent the situation where its removal matter removed from the object since confidence washing was carried out adheres to a washing member by the penetrant remover which flows through from the inner direction to the method of outside, and can prevent the situation where a washing member will soil a new object.

[0009]

[Example] Drawing 1 is the expanded sectional view of the washing station 11 of one example of this invention, and drawing 2 is the sectional view of a washing station 11. Although this example explains the example which washes the front face of the glass substrate used in case a liquid crystal display is manufactured, this invention is not limited to such an example. The work pieces 12, such as a glass substrate washed, are fixed to the rotation attachment component 13 by vacuum adsorption etc., and the rotation drive of this rotation attachment component 13 is carried out with high precision in arrow mark B1 direction. On a work piece 12, the brush 15 as a washing member covered with the covering 14 as a covering member \*\*\*\*s, and the parallel displacement of the brush 15 which consists of Nylon etc. is carried out to the longitudinal direction or perpendicularly [ space ] of drawing 2 it is shown by the arrow mark B3, a rotation drive being carried out in the direction of arrow mark B-2 with the revolving shaft 16 connected by configuration which is mentioned later. In this covering 14, penetrant removers, such as pure water, are supplied so that it may mention later. Such a work piece 12, the rotation attachment component 13, covering 14, etc. are contained in the scattering prevention frame 17 for preventing that a penetrant remover etc. disperses around.

[0010] The rotation drive of said revolving shaft 16 of a washing station 11 is carried out in the direction of arrow mark B-2 by the motor 18, and the tip is fixed to the shank 20 of body of revolution 19 by the same axle. The revolving shaft 16 and opposite side edge of a shank 20 are fixed to the disk section 21 as a rotation member of board thickness t1 by the same axle at one. In the periphery section of the disk section 21, the outer wall 22 of height h1 is continued and formed in the perimeter, and constitutes the circular ring-like liquid pool slot 23. Two or more bores 25a, 25b, 25c, and 25d formed in the condition of having inclined in the center-of-rotation location 24 approach of body of revolution 19 are formed in this disk section 21 as two or more places are covered and it is formed in a hoop direction so that it may mention later, and it becomes the shank 20 and the opposite side of the disk section 21 from the liquid pool slot 23 side.

[0011] Said brush 15 is implanted in the implantation field 26 of the method of the outside of radial at lower limit section 21a of the shank 20 of the disk section 21, and the opposite side rather than the formation range of the Bores [ 25a and 25d ] lower limit section 21a side opening.

[0012] The major diameter 27 which carries out the enclosure of the disk section 21, the medium diameter portion 28 which carries out the enclosure of the shank 20, and the narrow diameter portion 29 which carries out the enclosure of the revolving shaft 16 are formed in one at the same axle, and the covering 14 which carries out the enclosure of such body of revolution 19 and a brush 15 changes.

Between said shanks 20 and medium diameter portions 28, the bearing 30 which has sealing performance to a penetrant remover intervenes, and a magnetic seal TOBEA ring etc. supports covering 14 for body of revolution 19, enabling free rotation. It is constituted by the condition of separating the spacing d with very small connection section 33 which connects the major diameter 27 and medium diameter portion 28 of covering 14 and upper limit section of the outer wall 22 of the disk section 21. The lower limit section of the major diameter 27 of said covering 14 is constituted so that only height h2 may serve as the upper part from the point of a brush 15.

[0013] Along with this covering 14, four tubes 31a, 31b, 31c, and 31d fix, for example, and that point is arranged in the location which is penetrant remover feed zone material and which inserts in covering 14, faces the liquid pool slot 23 of the disk section 21, and attends opening by the side of the Bores [ 25a-25d ] liquid pool slot 23 still more preferably. Each tubes 31a-31d are connected to the penetrant remover feeder 32, and a penetrant remover is supplied.

[0014] Drawing 3 is the sectional view seen from cutting plane line X3-X3 of drawing 1, drawing 4 is the bottom view of said lower limit section 21a of body of revolution 19, and drawing 5 is drawing showing the flowing through direction of the penetrant remover in the base of body of revolution 19. As mentioned above, four bores 25a-25d separate regular intervals, and are formed in the liquid pool slot 23, and opening by the side of lower limit section 21a of said the disk section 21 is formed in center-of-rotation location 24 approach.

[0015] Hereafter, actuation of a washing station 11 is explained. As a washing station 11 shows drawing 2, when \*\*\*ing to a work piece 12, a penetrant remover is supplied in said liquid pool slot 23 through Tubes 31a-31d from the penetrant remover feeder 32. With this, the rotation drive of the rotation attachment component 13 is carried out in the arrow mark B1 direction, and the rotation drive of the revolving shaft 16 is carried out in the direction of arrow mark B-2. A part of penetrant remover supplied in the liquid pool slot 23 by this falls between covering 14 and the disk sections 21 over an outer wall 22, and it carries out preliminary washing of the field which is going to move to the method of the outside of radial, and is going to wash a work-piece 12 top with a brush 15 on a work piece 12 after this beforehand. On the other hand, the part of the remainder of the penetrant remover in the liquid pool slot 23 falls caudad through each bores 25a-25d, and diffusing a work-piece 12 top in the method of the outside of radial, as shown in drawing 5 arrow mark B4, it circles in the direction of arrow mark B-2, and it washes a work-piece 12 top with the brush 15 by which the rotation drive is carried out.

[0016] The whole field of the work piece 12 covered with body of revolution 19 by this can be covered, a penetrant remover can be spread, and detergency can be performed efficiently. Moreover, since the penetrant remover from Bores 25a-25d passes through the inside of a brush 15, moving a work-piece 12 top to the method of the outside of radial, it also realizes the operation which washes a brush 15. Therefore, the removal matter removed from the work piece 12 adheres to a brush 15 again, and can prevent the situation which soils a work piece 12 again, and the situation which soils the work piece 12 set that it should newly wash. Washing capacity can be improved also at this point.

[0017] Drawing 6 is a sectional view corresponding to said drawing 3 of body-of-revolution 19a of other examples of this invention, and drawing 7 is the bottom view of body-of-revolution 19a. This example is similar to the above-mentioned example, and gives the same reference mark to a corresponding part. The point that this example should be observed is inclining aslant in the direction of arrow mark B-2, and constituting in it along a hoop direction, while inclining aslant in center-of-rotation location 24 approach, applying said bores 25a-25d prepared by penetrating the disk section 21 in the direction of board thickness from the liquid pool slot 23 side opening to the lower limit section 21a side opening.

[0018] Thereby, in drawing 7, the penetrant remover from Bores 21a-25b has the momentum component of a hoop direction, as arrow mark B5 shows, it falls on a work piece 12, and constitutes a vortex. It is diffused in the method of the outside of radial, such a penetrant remover circling in a work piece 12 top to a curled form like arrow mark B5 shown in drawing 8. Therefore, the time amount to which a penetrant remover passes through the inside of a brush 15 increases, and the washing effectiveness of a work piece 12 and a brush 15 improves further by the fault style of a penetrant remover.

[0019] Drawing 9 is the sectional view of body-of-revolution 19b of the example of further others of this invention. This example is similar to the above-mentioned example, and gives the same reference mark to a corresponding part. Within the disk section 21, the bores 25a-25d which carry out opening of the point that this example should be observed to the liquid pool slot 23 are crooked, are formed toward the method of the inside of radial, and are opened for free passage by the common hole 35 in the center-of-rotation section.

[0020] That is, in this example, the need of forming four openings corresponding to each bores 25a-25d in lower limit section 21a of the disk section 21 is canceled, \*\*\*\* which forms the single common hole 35 near the center-of-rotation section is good, and the implantation field 26 in which a brush 15 is implanted can be expanded. That is, also by this example, while being able to attain the effectiveness stated in the above-mentioned example, and the same effectiveness, the installation area of a brush 15 can be expanded and washing effectiveness can be expanded also in this point.

[0021]

[Effect of the Invention] With a washing station, if this invention is followed as mentioned above, when it is going to wash an object, the washing member of a rotation member with which the side edge section was equipped on the other hand will slide on an object, and detergency will be performed. At this time, the penetrant remover for washing is supplied to the other side edge of a rotation member through a covering member, passes along the bore currently continued and formed in the side edge section on the other hand from the other side edge concerned, and flows out near [ in / on the other hand / the side edge section ] the center-of-rotation location of a rotation member. Therefore, the penetrant remover on an object is diffused in the method of outside through a washing member.

Thereby, detergency is performed to a washing member using a penetrant remover.

[0022] moreover, since it spreads in the method of outside from near the center-of-rotation location of said rotation member, a penetrant remover can do \*\* over which said washing member covers the front face in contact with an object, and spreads a penetrant remover, can boil washing capacity markedly and can improve. Moreover, a washing member can prevent the situation where its removal matter removed from the object since confidence washing was carried out adheres to a washing member by the penetrant remover which flows through from the inner direction to the method of outside, and can prevent the situation where a washing member will soil a new object.

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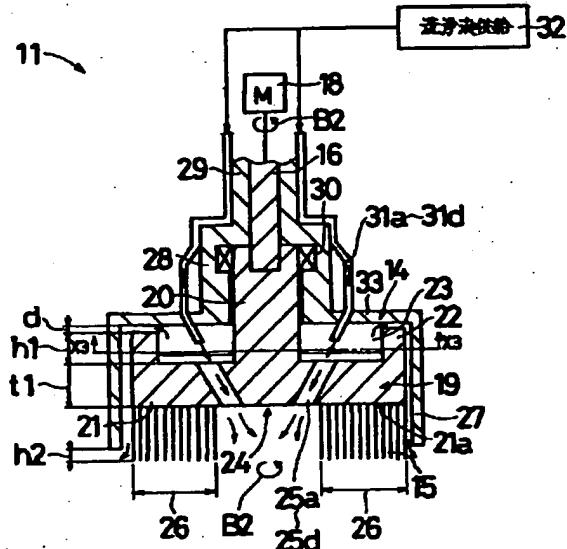
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(54)【発明の名称】 洗浄装置

(57) 【要約】

【目的】 対象物に対する洗浄能力を向上できると共に、対象物に洗浄する洗浄部材が汚損される事態を防止する洗浄装置を提供することである。

【構成】 洗浄液供給装置32からチューブ31a～31dを介して、カバー14で被覆された回転体19の液溜め溝23内に洗浄液が供給される。洗浄液の一部は外壁22を越えて、カバー14との間を下方へ落下する。液溜め溝23の残余の洗浄液は、透孔25a～25dを介してワーク12上に落下し、ブラシ15中を通過して半径方向外方に拡散する。



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## 【特許請求の範囲】

【請求項1】回転軸線まわりに回転駆動され、軸線方向一方側端部における回転中心位置付近以外の範囲に洗浄部材が装着され、他方側端部から前記一方側端部に亘り、前記回転中心位置付近の範囲内部に開口する透孔が形成される回転部材と、

回転部材を外周して回転自在に保持し、前記洗浄部材側が開口し、かつ回転部材の前記他方端部に向けて洗浄液を供給する洗浄液供給部材が設けられるカバーパー材とを含むことを特徴とする洗浄装置。

## 【発明の詳細な説明】

## 【0001】

【産業上の利用分野】本発明は、半導体製造工程、液晶表示装置製造工程あるいは各種電子部品などの製造工程において、ガラス基板、シリコンウエハあるいは印刷配線基板などの板状体上のごみや汚れなどを洗浄して除去する際に用いられる洗浄装置に関する。

## 【0002】

【従来の技術】液晶表示装置の製造工程や印刷配線基板の製造工程などにおいて、例として基板上に回路配線を周知のホトプロセスでパターン形成する際に、洗浄工程が必須である。図10は、典型的な従来例の洗浄装置1の断面図である。例として表面にITO(インジウムスズ酸化物)の薄膜が形成され、これが所望の回路配線形状にエッチングされた段階のガラス基板などである洗浄の対象となるワーク2は、回転保持部材3に真空吸着などによって固定され、高精度に矢符A1方向に回転駆動される。このようなワーク2および回転保持部材3は、飛散防止枠4内に収納され、上方から矢符A2方向に回転駆動される回転部材5が挿入され、また回転部材5のブラシ6付近に洗浄液を噴射する一対のノズル7、8が設けられる。

【0003】この従来例では、ノズル7、8からワーク2上に洗浄液を噴出し、この洗浄液と矢符A2方向に回転駆動しつつ矢符A3方向に走行する回転部材5により洗浄作用を達成するようにしている。

## 【0004】

【発明が解決しようとする課題】従来の洗浄装置1では、ワーク2の汚れやごみなどを除去する際に、その汚れやごみなどにより回転部材5のブラシ6を汚損してしまい、またそのような汚れやごみなどは一般に除去が困難であり、このためブラシ6に残存しているごみや汚れなどが次に洗浄されるガラス基板に再付着してしまうことになる。その結果、ブラシ6によるごみなどの除去能力が低下してしまう。またノズル7、8はブラシ6に対して外部から洗浄液を吐出するため、ブラシ6がワーク2に接触する範囲の全体に亘って洗浄液を行き渡せることが困難であり、ごみなどの除去効率が低下するという課題を有している。

【0005】本発明の目的は、上述の技術的課題を解消

し、対象物に対する洗浄能力を向上できると共に対象物に洗浄する洗浄部材が汚損される事態を防止する洗浄装置を提供することである。

## 【0006】

【課題を解決するための手段】本発明は、回転軸線まわりに回転駆動され、軸線方向一方側端部における回転中心位置付近以外の範囲に洗浄部材が装着され、他方側端部から前記一方側端部に亘り、前記回転中心位置付近の範囲内部に開口する透孔が形成される回転部材と、回転部材を外周して回転自在に保持し、前記洗浄部材側が開口し、かつ回転部材の前記他方端部に向けて洗浄液を供給する洗浄液供給部材が設けられるカバーパー材とを含むことを特徴とする洗浄装置である。

## 【0007】

【作用】本発明の洗浄装置で、対象物を洗浄しようとする場合、回転部材の一方側端部に装着された洗浄部材が対象物に摺動して洗浄作用を行う。このとき洗浄のための洗浄液は、カバーパー材を介して回転部材の他方側端部に供給され、当該他方側端部から一方側端部に亘って形成されている透孔を通り、回転部材の一方側端部における回転中心位置付近に流出する。したがって対象物上の洗浄液は、洗浄部材を経て外方に拡散する。これにより洗浄部材には、洗浄液を用いて洗浄作用が行われる。

【0008】また、洗浄液は前記回転部材の回転中心位置付近から外方に広がるので、前記洗浄部材が対象物と接触する前面に亘って、洗浄液を行き渡らせることができ、洗浄能力を格段に向上することができる。また洗浄部材は、内方から外方に流過する洗浄液によってそれ自信洗浄されるので、対象物から除去した除去物質が洗浄部材に付着する事態が防止でき、新たな対象物を洗浄部材が汚損することになる事態を防止できる。

## 【0009】

【実施例】図1は本発明の一実施例の洗浄装置11の拡大断面図であり、図2は洗浄装置11の断面図である。本実施例は、たとえば液晶表示装置を製造する際に用いられるガラス基板の表面を洗浄する例について説明するが、本発明はこのような実施例に限定されるものではない。洗浄されるガラス基板などのワーク12は、真空吸着などにより回転保持部材13に固定され、この回転保持部材13は矢符B1方向に高精度に回転駆動される。ワーク12上には、カバーパー材としてのカバー14で被覆された洗浄部材としてのブラシ15が摺接し、ナイロン樹脂などから成るブラシ15は後述するような構成によって連結される回転軸16によって矢符B2方向に回転駆動されつつ、矢符B3で示す図2の左右方向あるいは紙面垂直方向に平行移動する。このカバー14内には、後述するように純水などの洗浄液が供給される。このようなワーク12、回転保持部材13およびカバー14などは洗浄液などが周囲に飛散するのを防止するための飛散防止枠17内に収納される。

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【0010】洗浄装置11の前記回転軸16は、モータ18によって矢符B2方向に回転駆動され、その先端は回転体19の軸部20に同軸に固定される。軸部20の回転軸16と反対側端部は、板厚t1の回転部材としての円板部21に同軸に一体に固定される。円板部21の周縁部には、高さh1の外壁22が全周に亘って形成され、円環状の液溜め溝23を構成する。この円板部21には、後述するように周方向に複数箇所に亘って形成され、かつ液溜め溝23側から円板部21の軸部20と反対側になるに従い、回転体19の回転中心位置24寄りに傾斜した状態に形成される複数の透孔25a, 25b, 25c, 25dが形成される。

【0011】円板部21の軸部20と反対側の下端部21aには、透孔25a, 25dの下端部21a側開口部の形成範囲よりも、半径方向外方の植設領域26に前記ブラシ15が植設される。

【0012】このような回転体19およびブラシ15を外囲するカバー14は、円板部21を外囲する大径部27と、軸部20を外囲する中径部28と、回転軸16を外囲する小径部29とが同軸に一体に形成されて成る。前記軸部20と中径部28との間には、たとえば磁気シールドベアリングなど、洗浄液に対して密封性を有する軸受30が介在され、カバー14は回転体19を回転自在に支承する。カバー14の大径部27と中径部28とを連結する連結部33と、円板部21の外壁22の上端部とは、微少な間隔dを隔てる状態に構成される。前記カバー14の大径部27の下端部は、ブラシ15の先端部よりも高さh2だけ上方となるように構成される。

【0013】このカバー14に沿って、洗浄液供給部材であるたとえば4本のチューブ31a, 31b, 31c, 31dが固着され、その先端部はカバー14を挿通して円板部21の液溜め溝23に臨み、さらに好ましくは透孔25a～25dの液溜め溝23側の開口部に臨む位置に配置される。各チューブ31a～31dは、洗浄液供給装置32に接続され洗浄液が供給される。

【0014】図3は図1の切断面線X3-X3から見た断面図であり、図4は回転体19の前記下端部21aの底面図であり、図5は回転体19の底面における洗浄液の流れ方向を示す図である。液溜め溝23には、前述したようにたとえば4つの透孔25a～25dが等間隔を隔てて形成され、その前記円板部21の下端部21a側の開口部は、回転中心位置24寄りに形成される。

【0015】以下、洗浄装置11の動作について説明する。洗浄装置11が図2に示すように、ワーク12に接続するとき、洗浄液供給装置32から洗浄液がチューブ31a～31dを介して、前記液溜め溝23内に供給される。これと共に、回転保持部材13が矢符B1方向に回転駆動され、かつ回転軸16が矢符B2方向に回転駆動される。これにより液溜め溝23内に供給された洗浄液の一部分は、外壁22を越えてカバー14と円板部2

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1との間を落下し、ワーク12上を半径方向外方に移動し、ワーク12上でこれからブラシ15によって洗浄しようとする領域を予め予備洗浄する。一方、液溜め溝23内の洗浄液の残余の部分は、各透孔25a～25dを介して下方に落下し、ワーク12上を図5矢符B4に示すように半径方向外方に拡散しつつ矢符B2方向に旋回し、回転駆動されているブラシ15と共にワーク12上を洗浄する。

【0016】これにより回転体19で被覆されるワーク12の領域の全体に亘って洗浄液を行き渡らせることができ、洗浄作用を効率的に行うことができる。また透孔25a～25dからの洗浄液は、ワーク12上を半径方向外方に移動しつづブラシ15中を通過するので、ブラシ15を洗浄する作用も実現する。したがってワーク12から除去された除去物質が再びブラシ15に付着して、再びワーク12を汚損する事態や、新たに洗浄すべくセットされたワーク12を汚損する事態を防止できる。この点でも、洗浄能力を向上することができる。

【0017】図6は本発明の他の実施例の回転体19aの前記図3に対応する断面図であり、図7は回転体19aの底面図である。本実施例は前述の実施例に類似し、対応する部分には同一の参照符を付す。本実施例の注目すべき点は、円板部21を板厚方向に貫通して設けられる前記透孔25a～25dを液溜め溝23側開口部から下端部21a側開口部へかけて、回転中心位置24寄りに斜めに傾斜すると共に、周方向に沿って矢符B2方向に斜めに傾斜して構成することである。

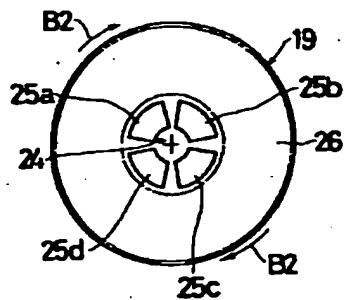
【0018】これにより透孔21a～25bからの洗浄液は、図7に矢符B5で示すように周方向の運動量成分を有し、ワーク12上に落下して渦流を構成する。このような洗浄液は、ワーク12上を図8に示す矢符B5のように渦巻き状に旋回しつづ、半径方向外方に拡散する。したがって洗浄液がブラシ15中を通過する時間が増大し、かつ洗浄液の過流によってワーク12およびブラシ15の洗浄効率がさらに向上される。

【0019】図9は、本発明のさらに他の実施例の回転体19bの断面図である。本実施例は前述の実施例に類似し、対応する部分には同一の参照符を付す。本実施例の注目すべき点は、液溜め溝23に開口する透孔25a～25dは円板部21内で、半径方向内方に向かって屈曲して形成され、回転中心部で共通孔35に連通される。

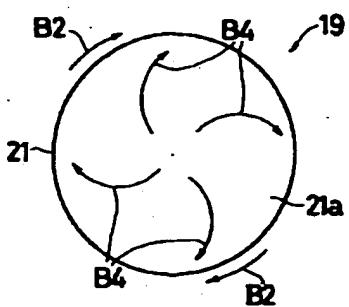
【0020】すなわち本実施例では、円板部21の下端部21aに各透孔25a～25dに対応した4つの開口部を形成する必要が解消され、回転中心部付近に单一の共通孔35を形成するればよく、ブラシ15が植設される植設領域26を拡大することができる。すなわち本実施例によっても、前述の実施例で述べた効果と同様な効果を達成できると共に、ブラシ15の設置面積を拡大でき、この点においても洗浄効率を拡大することができ



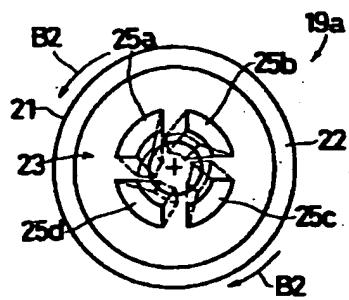
【図4】



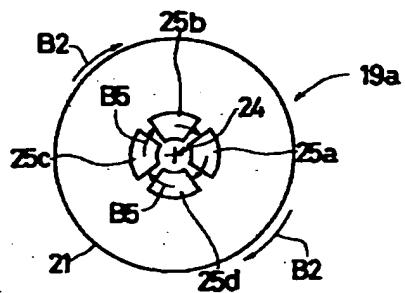
【図5】



【図6】



【図7】



【図9】

